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added. The work is a notable contribution to our knowledge of the flora of Madagascar.—J. M. GREENMAN.

**North American Flora.**<sup>5</sup>—Part 4 of Vol. XXII contains a continuation of Dr. P. A. RYDBERG's elaboration of the Rosaceae. The groups treated are *Potentilla* and the related genera. In all sixteen genera are here considered, and to these the author refers 277 species, of which 70, approximately one-fourth, are described as new. *Potentilla* leads with 176 recognized species, 44 being published as new to science. Two new genera (*Zygalthemilla* and *Lachemilla*) are proposed.—J. M. GREENMAN.

## NOTES FOR STUDENTS

**Longevity of seeds.**—In a long paper<sup>6</sup> EWART classifies seeds according to their duration of life under optimal conditions as: microbiotic seeds, with a longevity of less than 3 years; mesobiotic, with a longevity of 3 to 15 years; and macrobiotic, with a longevity of 15 to 100 years. Most of the paper (175 out of 210 pages) is taken up with a table, drawn from the works of various investigators, showing the age, percentage of vitality, etc., of various stored and buried seeds. EWART says: "Longevity depends not on the food materials or seed coats, but upon how long the inert protein molecules, into which the living protoplasm disintegrates when drying, retain the molecular grouping which permits of their recombination to form the active protoplasmic molecule when the seed is moistened and supplied with oxygen." Longevity, however, he holds, is in general found in seeds with seed coats impervious to water, and asserts that this impermeability is due to cuticular structures in almost all cases examined. In *Adansonia digitata*, on the other hand, all layers of the coats are equally resistant to water.

He agrees with CROCKER that seed-coat characters rather than embryo characters account for the greater number of cases of delayed germination, and he makes considerable use of the data of this writer as evidence on this point. He believes that the longevity of seeds in soil is far less than is generally assumed. The maximal duration of the seeds of certain Leguminosae under optimal conditions is stated to be between 150 and 250 years, and of Malvaceae and Nymphaeaceae between 50 and 150 years. An appendix by Miss JEAN WHITE gives the structure of the coats of various resistant seeds. The body of the work is marred by a number of inexcusable errors in the statement of the results of other investigators.—WM. CROCKER.

**Enzymes.**—GRÜSS has suggested<sup>7</sup> a method of capillary analysis of enzymes for which he claims considerable value. It consists in pulverizing a portion of the

<sup>5</sup> North American Flora, Vol. XXII, Part 4, pp. 293-388. New York Botanical Garden, 1908.

<sup>6</sup> EWART, ALFRED J., On the longevity of seeds. Proc. Roy. Soc. Victoria. N.S. 21:1-20. pls. 1, 2. 1908.

<sup>7</sup> GRÜSS, J., Kapillaranalyse einiger Enzyme. Ber. Deutsch. Bot. Gesells. 26a: 620-626. 1908.

tissue containing the enzyme in a small amount of glycerin and placing this on a filter paper. From this mass the water circle spreads and the enzymes can be located at various radial distances from the center. In dealing with oxidases the whole process is performed in an atmosphere of hydrogen. It is not evident that this method is of any great value further than as a mere means of demonstrating the presence of certain enzymes. GRÜSS also claims by it to gain evidence that cytase is not distinct from diastase, and believes he has shown in a number of other cases that a single enzyme performs several catalytic functions. His arguments against the specificity of enzymes are to a degree plausible, but are far from conclusive.

GRÜSS also asserts,<sup>8</sup> on the basis of considerable experimental evidence, that the reducing power of fermenting yeast attributed to the action of reductase can be accounted for by the nascent hydrogen set free by the hydrogenase of the yeast. In the presence of fermenting yeast the reduction of sodium seleniate and sulfur occur as they do when treated with nascent hydrogen. He finds no evidence for postulating reductase in yeast. He believes that the fungi in general possess hydrogenase and not reductase. If this be true the reductions carried on by this group of plants are strikingly similar to the simplest reductions in the chemical laboratory. He agrees that yeast and other fungi show a very slight reducing power not due to hydrogenase, but the substance that produces this slight reduction shows none of the characteristics of an enzyme.—WM. CROCKER.

**Germination in Rhinanthaceae.**—SPERLICH<sup>9</sup> believes he has demonstrated that the germination of the seeds of the partially parasitic species, *Melampyrum silvaticum*, *M. arvense*, and *Alectorolophus hirsutus*, is greatly hastened by the presence of the host plant. These seeds show a considerable rest period and he concludes that the favorable action of the host is evident only up to the completion of the "after-ripening." A close examination of his data shows that his conclusions do not necessarily follow from them. He always gets a very low percentage of germination and great variations in results from similar cultures. This indicates the presence of some uncontrolled factor. On discussing "after-ripening" he makes no mention of the general connection of delayed and distributed germination with the seed coats, but attributes these phenomena to embryo characters. He apparently has no knowledge of the literature on the subject. One wonders if his results are not merely the measurement of seed-coat effects. He certainly has not demonstrated dormancy in the embryo itself, which is the first step in establishing his main position. The disposition of a number of German investigators to refer the phenomena of "after-ripening" to the mysteries of the protoplasm is to be deplored, especially when a thorough examination of the facts will often furnish a very simple explanation. It must not be forgotten, however,

<sup>8</sup> GRÜSS, J., Hydrogenase oder Reduktase? *Idem*: 627-630. 1908.

<sup>9</sup> SPERLICH, ADOLPH, Ist bei grünen Rhinanthaceen ein von einen pflanzlichen Organismus ausgehender äusserer Keimungsreiz nachweisbar? *Ber. Deutsch. Bot. Gesells* 26a: 574-587. 1908.